CIB W78+W74 TOKYO SEMINAR / SEPTEMBER 17-19th 1990

Computer-oriented Administrative Checking System of Building Design
: Standard coding system based on ACT and CIB concepts

Tatsuo Terai, Chiba Institute of Technology, Japan

Abstract

This paper is a brief description of an ongoing Japanese national project to develop computer-oriented checking system for lawfulness of building design. This system is considered to bring several drastic effects onto the industry derived from reduction of judgement time and ambiguity caused by personal equation and so on. Major subjects to be investigated in the first stage of development until April 1992 are databases of relating building codes and geographical data, standardized data description formats for outline figure and structure of sites and buildings and rationalized drawing methods with less redundancy. Revised framework for standard coding system is proposed.

1. Introduction

Various kind of CAD systems are used in growing number of architect offices and design divisions in general contractors. Accordingly, demand for effective data exchange between different CAD systems has recently increased to much extent. It is considered very difficult, however, to have such an exchange system with wide popularity in the Japanese construction industry. Standardization is a quite difficult task in this field caused by high activeness and large scale size of the industry.

A most feasible solution to breakthrough this chaotic situation is to introduce some kind of standards or recommendations into a common specific point in the building processes. As is often the case, practical building design projects in Japan must be checked their legitimacy by administrative authorities.

The checking system is currently of manual practice and has been strongly requested to change into much more sophisticated advanced way utilizing information and automation technology. This administrative check is well regarded as an above-mentioned specific point in the building processes common to almost all kinds of building projects.

2. Development of the system required

A national project called "Development of Advanced Checking System of Building Projects" has been executed since April 1989. One of its long range

targets is to accomplish a paperless checking system against digitalized application data made by CAD systems in the building design or briefing process. This system is considered to bring several drastic effects onto the industry as follows:

- to reduce judgement time
- to reduce ambiguity caused by personal equation
- to reduce application cost and time by directly utilizing CAD data formalized in planning and design phases
- to facilitate the spread of practical CAD use in the industry

Within the first stage of the R&D project, since April 1989 to April 1992, relating building codes and geographical data are planned to be installed in the system as digital reference databases. Standardized data description formats are also to be determined to denote outline figure and structure of sites and buildings to be checked. Application with ordinary documentations such as drawings and specifications is parallelly available in the first stage of execution. Therefore, rationalized drawing methods with less redundancy is also planned to be established.

3. ACT standard coding system

Although there is yet no standard coding system widely prevailing in the Japanese construction industry, a conceptual framework for the potential standard coding system has been developped in another national R&D project. This basic structure called ACT, Advanced Construction Technology, coding system has been accepted in several large R&D projects to be the bases of their relevant coding systems.

ACT standard coding system consists of six major coding subsystems which again consist of several small tables as follows;

group 1 : CONDITION
location, area type, area attribute, building type, user attribute

group 2 : METHOD
management method, construction system, investigation, rule

group 3 : SPECIFICATION / PERFORMANCE
physics, function, specification, use
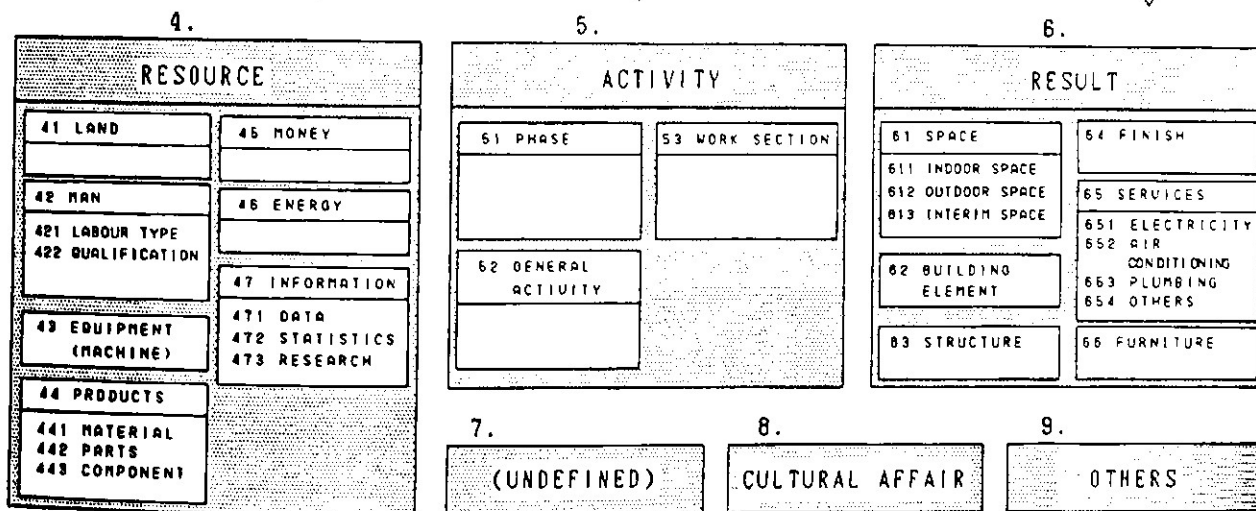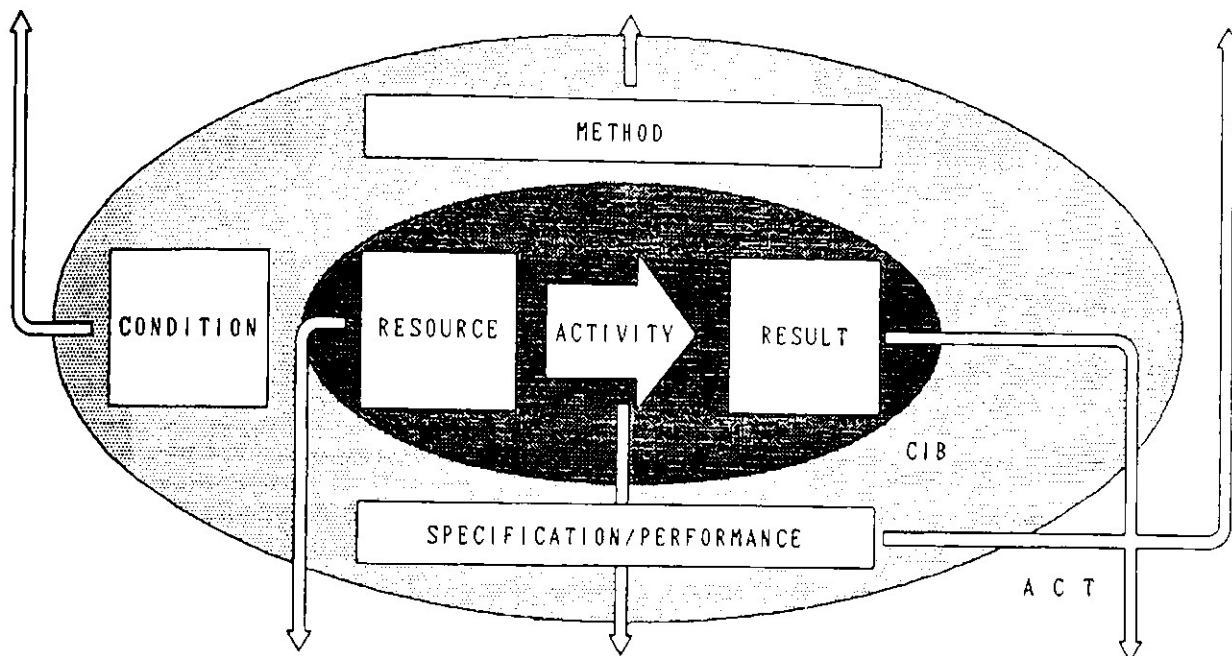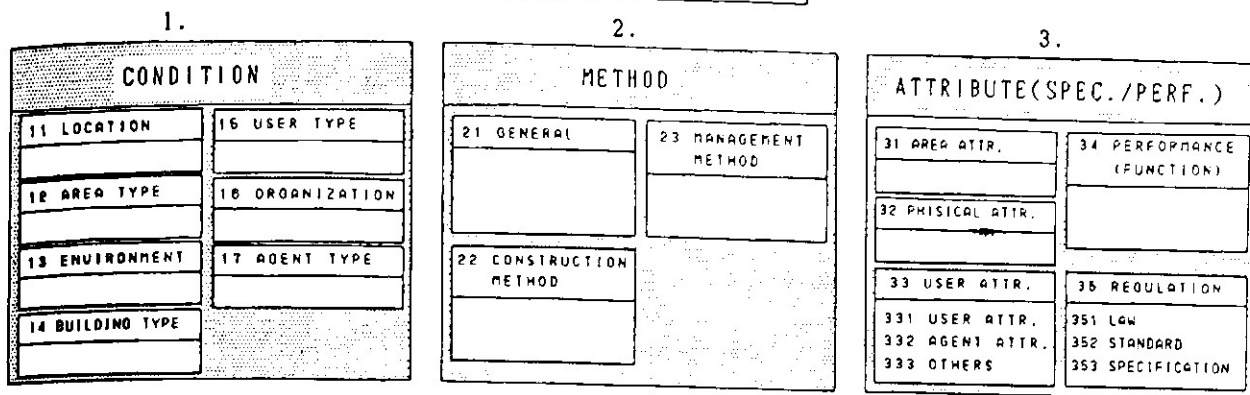
group 4 : RESOURCE
man, machine, energy, material, money

group 5 : ACTIVITY
phase, activity

group 6 : RESULT
space, structure, finish, services

ACT CODING SYSTEM

1. CONDITION

11 LOCATION	16 USER TYPE
12 AREA TYPE	16 ORGANIZATION
13 ENVIRONMENT	17 AGENT TYPE
14 BUILDING TYPE	

2. METHOD

| 21 GENERAL | 23 MANAGEMENT METHOD |
| 22 CONSTRUCTION METHOD | |

3. ATTRIBUTE(SPEC./PERF.)

31 AREA ATTR.	34 PERFORMANCE (FUNCTION)
32 PHISICAL ATTR.	
33 USER ATTR.	36 REGULATION
331 USER ATTR.	351 LAW
332 AGENT ATTR.	352 STANDARD
333 OTHERS	353 SPECIFICATION

METHOD

CONDITION → RESOURCE → ACTIVITY → RESULT

SPECIFICATION/PERFORMANCE

CIB

ACT

4. RESOURCE

41 LAND	46 MONEY
42 MAN	46 ENERGY
421 LABOUR TYPE	
422 QUALIFICATION	47 INFORMATION
	471 DATA
43 EQUIPMENT (MACHINE)	472 STATISTICS
	473 RESEARCH
44 PRODUCTS	
441 MATERIAL	
442 PARTS	
443 COMPONENT	

5. ACTIVITY

| 61 PHASE | 53 WORK SECTION |
| 62 GENERAL ACTIVITY | |

6. RESULT

61 SPACE	64 FINISH
611 INDOOR SPACE	
612 OUTDOOR SPACE	65 SERVICES
613 INTERIM SPACE	651 ELECTRICITY
	652 AIR CONDITIONING
62 BUILDING ELEMENT	653 PLUMBING
	654 OTHERS
63 STRUCTURE	66 FURNITURE

7. (UNDEFINED)

8. CULTURAL AFFAIR

9. OTHERS

This system is of a sort of modification of so-called CIB coding system concept with three basic groups; resources, activities and results. Group 1 to 3 of ACT coding system are derived from environmental items with high difficulty to be classified into the basic three groups.

4. Revision of ACT coding system

A standard coding system is an essential factor to the successful checking system to utilize common reference databases and to accept building project data made by different CAD systems. ACT standard coding system is a congregation of independent coding subsystems. The system is to work as a common base for different practical coding systems to ensure effective data exchange. Direct use of ACT system is not recommended for ordinary practices because of its redundancy. Therefore, it should be noticed that the advanced checking system needs its own practical coding system based on ACT standard coding system.

Current ACT coding system is a sort of prototype and incompletely formalized. It should be modified to meet with practical requirements in actual cases prior to development of the practical coding system in question. ACT coding system is planned to be revised to get in harmony with internationally standardized coding system for building practice in the near future.

The figure shows the result of modification.

5. Conclusion

Ongoing study on standard coding system in the advanced checking system has prooved the necessity of such a standard coding system like ACT. To cope with the progress of CIB coding system development, ACT coding system has been revised to some extent and checked its effectiveness. ACT system is considered to be more comprehensive than CIB system currently proposed. Efforts should be made to harmonize ACT and CIB systems with each other.

6. Acknowledgment